electroprocessed material can be electroprocessed from one or more grounded reservoirs in the direction of a charged substrate or from charged reservoirs toward a grounded target. "Electrospinning" means a process in which fibers are formed from a solution or melt by streaming an electrically charged solution or melt through an orifice. "Electroaerosoling" means a process in which droplets are formed from a solution or melt by streaming an electrically charged polymer solution or melt through an orifice. The term electroprocessing is not limited to the specific examples set forth herein, and it includes any means of using an electrical field for depositing a material on a target.

The term "material" refers to any compound, molecule, substance, or group or combination thereof that forms any type of structure or group of structures during or after electroprocessing. Materials include natural materials, synthetic materials, or combinations thereof. Naturally occurring organic materials include any substances naturally found in the body of plants or other organisms, regardless of whether those materials have or can be produced or altered synthetically. Synthetic materials include any materials prepared through any method of artificial synthesis, processing, or manufacture. Preferably the materials are biologically compatible materials.

One class of synthetic materials, preferably biologically compatible synthetic materials, comprises polymers. Such polymers include but are not limited to the following: poly(urethanes), poly(siloxanes) or silicones, poly(ethylene), poly(vinyl pyrrolidone), poly(2-hydroxy ethyl methacrylate), poly(N-vinyl pyrrolidone), poly(methyl methacrylate), poly(vinyl alcohol), poly(acrylic acid), polyacrylamide, poly(ethylene-co-vinyl acetate), poly(ethylene glycol), poly(methacrylic acid), polylactides (PLA), polyglycolides (PGA), poly(lactide-co-glycolides) (PLGA), polyanhydrides, and polyorthoesters or any other similar synthetic polymers that may be developed that are biologically compatible. The term "biologically compatible, synthetic polymers" shall also include copolymers and blends, and any other combinations of the forgoing either together or with other polymers generally. The use of these polymers will depend on given applications and specifications required. A more detailed discussion of these polymers and types of polymers is set forth in Brannon-Peppas, Lisa, "Polymers in Controlled Drug Delivery," Medical Plastics and Biomaterials, November 1997, which is incorporated by reference as if set forth fully herein.

"Materials" also include electroprocessed materials that are capable of changing into different materials during or after electroprocessing. For example, the protein fibrinogen, when combined with thrombin, forms fibrin. Fibrinogen or thrombin that are electroprocessed as well as the fibrin that later forms are included within the definition of materials. Similarly, procollagen will form collagen when combined with procollagen peptidase. Procollagen, procollagen peptidase, and collagen are all within the definition.

In a preferred embodiment, the electroprocessed materials form a matrix. The term "matrix" refers to any structure comprised of electroprocessed materials. Matrices are comprised of fibers, or droplets of materials, or blends of fibers and droplets of any size or shape. Matrices are single structures or groups of structures and can be formed through one or more electroprocessing methods using one or more materials. Matrices are engineered to possess specific porosities. Substances may be deposited within, or anchored to or placed on matrices. Cells are substances which may be deposited within or on matrices.

One preferred class of materials for electroprocessing to make the compositions of the present invention comprises proteins. Extracellular matrix proteins are a preferred class of proteins in the present invention. Examples include but are not limited to collagen, fibrin, elastin, laminin, and fibronectin. Additional preferred materials are other components of the extracellular matrix, for example proteoglycans. In each case, those names are used throughout the present application in their broadest definition. There are multiple types of each of these proteins that are naturally-occurring as well as types that can be or are synthetically manufactured or produced by genetic engineering. For example, collagen occurs in many forms and types. All of these types and subsets are encompassed in the use of the proteins named herein. The term protein further includes, but is not limited to, fragments, analogs, conservative amino acid substitutions, and substitutions with non-naturally occurring amino acids with respect to each named protein. The term "residue" is used herein to refer to an amino acid (D or L) or an amino acid mimetic that is incorporated into a protein by an amide bond. As such, the amino acid may be a naturally occurring amino acid or, unless otherwise limited, may encompass known analogs of natural amino acids that function in a manner similar to the naturally occurring amino acids (*i.e.*, amino acid mimetics). Moreover, an amide bond mimetic includes peptide backbone modifications well known to those skilled in the art.

Furthermore, one of skill will recognize that, as mentioned above, individual substitutions, deletions or additions which alter, add or delete a single amino acid or a small percentage of amino acids (typically less than 5%, more typically less than 1%) in an encoded sequence are conservatively modified variations where the alterations result in the substitution of an amino acid with a chemically similar amino acid. Conservative substitution tables providing functionally similar amino acids are well known in the art. The following six groups each contain amino acids that are conservative substitutions for one another:

1) Alanine (A), Serine (S), Threonine (T);
2) Aspartic acid (D), Glutamic acid (E);
3) Asparagine (N), Glutamine (Q);
4) Arginine (R), Lysine (K);
5) Isoleucine (I), Leucine (L), Methionine (M), Valine (V); and
6) Phenylalanine (F), Tyrosine (Y), Tryptophan (W).

It is to be understood that the term protein, polypeptide or peptide further includes fragments that may be 90 to 95% of the entire amino acid sequence, and also extensions to the entire amino acid sequence that are 5% to 10% longer than the amino acid sequence of the protein, polypeptide or peptide.

When peptides are relatively short in length (*i.e.*, less than about 50 amino acids), they are often synthesized using standard chemical peptide synthesis techniques. Solid phase synthesis in which the C terminal amino acid of the sequence is attached to an insoluble support followed by sequential addition of the remaining amino acids in the sequence is a preferred method for the chemical synthesis of the antigenic epitopes described herein. Techniques for solid phase synthesis are known to those skilled in the art.

Alternatively, the proteins or peptides that may be electroprocessed are synthesized using recombinant nucleic acid methodology. Generally, this involves creating a nucleic acid sequence that encodes the peptide or protein, placing the nucleic acid in an expression cassette under the control of a particular promoter, expressing the peptide or protein in a host, isolating the expressed peptide or protein and, if required, renaturing the peptide or protein. Techniques sufficient to guide one of skill through such procedures are found in the literature.

When several desired protein fragments or peptides are encoded in the nucleotide sequence incorporated into a vector, one of skill in the art will